IN THE U.S. PATENT AND TRADEMARK OFFICE BEFORE
THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of

Jorkki HYVONEN	Conf. 9230
Application No. 10/520,171	Group 2626
Filed January 4, 2005	Examiner M. Colucci

SEARCHING FOR SYMBOL STRING

MAY IT PLEASE YOUR HONORS:

(i)   **Real Party in Interest**

The real party in interest in this appeal is the inventor, Jorkki Hyvonen of Helsinki, Finland.

(ii)   **Related Appeals and Interferences**

None.

(iii)   **Status of Claims**

Claims 8-11 and 14-16 are pending from whose final rejection this appeal is taken. Claims 1-7, 12 and 13 were previously canceled.

(iv)   **Status of Amendments**

No amendment was filed subsequent to the final rejection of the claims on appeal.

(v)   **Summary of Claimed Subject Matter**

Each of independent claims 8, 15 and 16 is directed to a search of an input symbol string among symbol strings (see specification paragraph [0001]).

Claim 8 recites a computer readable medium encoded with a computer program for executing a method for searching for an input symbol string among a set of symbol strings (see original claim 6 and paragraph [0007]). The steps of the method executed by the program include as illustrated by way of example in Figure 1, creating a trie data structure of symbol strings (see paragraph [0016]). The symbol strings are grouped into branches in such a manner that the symbol strings beginning with the same symbols belong to the same branch, and the symbol strings in the same branch divide into new branches at the symbols, from which onwards the symbols strings differ from each other (see paragraph [0016]) The steps also include receiving an input formed of an input symbol string (see paragraph [0017]) and proceeding from the starting point of the trie data structure along a branch to a calculation point indicated by the next symbol (see paragraph [0018]). The steps further include calculating distances at the calculation point between a sample symbol string formed by the symbols of the calculation point of the branch in question and the calculation points preceding it and the input symbol string by comparing these in alternative ways (see paragraph [0018]) and calculating at the calculation point also the smallest possible length difference corresponding to each distance that indicates

how much the length of the remaining part of the input symbol string not examined in the distance calculation differs from the lengths remaining in the symbols strings passing through the calculation point, and calculating on the basis of each distance and corresponding length difference a reference value (see paragraphs [0019]-[0023]). The steps still further include selecting repeatedly the next branch to follow to the calculation point indicated by the next symbol, at which said calculation is repeated for the new calculation point, said selection of the next branch being performed in such a manner that next the routine proceeds from the calculation point, from which the lowest reference value has been obtained as result (see paragraph [0035]). Then, after the calculation has terminated, selecting one or more symbol strings having the shortest distance to the input symbol string on the basis of the performed calculations, and using the selected symbol string(s) to produce a response (see paragraphs [0039]-[0040]).

Claim 15 differs from claim 8 by being directed to an apparatus.

Claim 15 recites an apparatus loadable with a computer readable medium encoded with a computer program for searching for a symbol string among a set of symbol strings (see paragraph [0042]). The apparatus 10 includes, as illustrated by way of example in Figure 3, means 12 for creating a trie data structure of symbols strings by grouping the symbol strings into branches in such a manner that the symbol strings starting with the same

symbols belong to the same branch, and the symbols strings in the same branch divide into new branches at the symbols, from which onwards the symbol strings differ from each other (see paragraph [0043]) The apparatus also includes an input 11 for receiving an input symbol string and calculation means 14 for calculating distances between a sample symbol string formed by the symbols of the calculation point and the calculation points preceding it in the examined branch and the input symbol string by comparing these in alternative ways, and for calculating at the calculation points also the smallest possible length difference corresponding to each distance that indicates how much the length of the remaining part of the input symbol string not examined in the distance calculation differs from the lengths remaining in the symbols strings passing through the calculation point, and calculating on the basis of each distance and corresponding length difference a reference value (see paragraph [0044]). The apparatus further includes selection means 15 that repeatedly select the next branch to follow to the calculation point indicated by the next symbol, at which said calculation is repeated for the new calculation point, said selection means carrying out the branch selection in such a manner that next the routine proceeds from the calculation point, from which the lowest reference value has been obtained as result (see paragraph [0045]). The apparatus still further includes selection means 16 that, after the calculation is terminated, select one or more symbol strings with the shortest distance to the input on the

basis of the calculations, response production means 17 that produce a response by using the selected symbol string(s), and an output 18 for feeding the response onward (see paragraph [0046]).

Claim 16 is also an apparatus claim and differs from claim 15 by being directed to a circuit instead of the computer program of claim 15 (see paragraph [0042]).

Thus, the preamble of claim 16 recites an apparatus including at least one circuit for searching for a symbol string among a set of symbol strings. The apparatus recited in the body of claim 16 includes the following features of claim 15:

means 12 for creating a trie data structure ([0043]),

an input 11 for receiving an input symbol string ([0044]),

calculation means 14 for calculating distances ([0044]),

selection means 15 that repeatedly select the next branch ([0045]),

selection means 16 that, after the calculation is terminated, select one or more symbol strings with the shortest distance to the input on the basis of the calculations ([0046]),

response production means 17 ([0046]), and

an output 18 for feeding the response onward ([0046]).

(vi)   **Grounds of Rejection to be Reviewed on Appeal**

The first issue on appeal is whether claim 15 is directed to statutory subject matter.

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The second issue on appeal is whether claims 8-11, 14 and 15 comply with 35 USC 112, first paragraph written description requirement.

The third issue on appeal is whether claim 15 complies with 35 USC 112, second paragraph.

The fourth issue on appeal is whether claims 8-11 and 14-16 would have been obvious, in the meaning of 35 USC 103(a) , based on BALLARD et al. US 5,377,281 in view of KWOK US Publication No. 2002/0165873.

(vii)   **Arguments**

   Claim 15 is directed to statutory subject matter

Claim 15 is directed to an apparatus. The apparatus of claim 15 is able to be loaded with a computer readable medium. Although not limited to the disclosed embodiment, paragraph [0043] discloses an exemplary apparatus as a computer having a memory capable of reading/storing a computer program. It is clear from the specification that an apparatus based on a computer program as claimed in claim 15 is different than an apparatus as claimed in claim 16 that includes at least one circuit used to perform the symbol string search. However, as noted in paragraph [0042], the use of a program or a circuit is not mutually exclusive and the two might be combined in the same apparatus.

In view of this, it is believed that claim 15 complies with the statutory invention requirements of 35 U.S.C. 101, and

falls within one the four enumerated categories of patentable subject matter recited in section 101 (i.e., process, <u>machine</u>, manufacture, or composition of matter). Accordingly, reversal of the rejection is respectfully requested.

Claims 8-11, 14 and 15 comply with 35 USC 112, first paragraph written description requirement

The position set forth in the final rejection is that a computer readable medium is not disclosed or supported within the specification of the present invention.

Claim 6 of the application as filed, which is part of the specification, recites "6. A data medium readable by computer, characterized in that a computer program is readable from the data medium for performing the method according to any one of claims 1 to 4." This claim was also originally referred to in paragraph [0007].

Clearly, a data medium readable by computer is a computer readable medium.

Paragraphs [0043] and [0044] also disclose a memory and how this memory is used in conjunction with the recited method.

In view of this, one of ordinary skill in the art would understand that appellant had possession of the claimed invention within the meaning of 35 USC 112, first paragraph and reversal of this rejection is respectfully requested.

Claim 15 complies with 35 USC 112, second paragraph

The position set forth in the final rejection is that a computer loadable with a program is not the same as a computer loaded with the program.

Even taking this position at face value, it is not sufficient to reject the claim.

The test for definiteness under 35 U.S.C. 112, second paragraph, is whether "those skilled in the art would understand what is claimed when the claim is read in light of the specification." *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576, 1 USPQ2d 1081, 1088 (Fed. Cir. 1986).

As set forth above, paragraph [0043] discloses an exemplary apparatus as a computer having a memory capable of reading/storing a computer program. It is clear from the specification that an apparatus based on a computer program as claimed in claim 15 is different than, for example, an apparatus as claimed in claim 16 that includes at least one circuit used to perform the symbol string search. However, as noted in paragraph [0042], the use of a program or a circuit is not mutually exclusive and the two might be combined in the same apparatus.

In view of this, one of ordinary skill in the art would understand that the apparatus need not be pre-loaded with the program and only need be capable of being loaded with a program and that the apparatus can be operated based on a computer program, circuits or a combination of the two. Accordingly, it

is believed that claim 15 complies with 35 USC 112, second paragraph.

Claims 8-11 and 14-16 would not have been obvious based on BALLARD in view of KWOK

<u>Claim 8</u>

BALLARD discloses a method for searching for an input symbol string, such as words. The examined words are divided into a trie structure. See paragraph [0004] of the present invention for an example of how a trie structure operates.

KWOK disclose the use of an "edit distance" to calculate the distance between words by taking into account each letter in the word (see paragraph [0062]). The edit distance of KWOK is based on an entirely different method than the trie structure. KWOK is unrelated to a trie structure.

In any event, the Final Rejection recognizes that BALLARD fails to teach calculating the smallest possible length difference corresponding to each distance that indicates how much the length of the remaining part of the input symbol string not examined in the distance calculation differs from the lengths remaining in the symbols strings passing through the calculation point, <u>and</u> calculating on the basis of each distance and corresponding length difference a reference value.

KWOK is offered for these teachings with the Final Rejection concluding that it would have been obvious to combine BALLARD and KWOK to render obvious this feature.

However, even if one of ordinary skill in the art having the references before him were to consider the proposed combination in the first instance based on the different editing methods, the claimed invention does not result.

Claim 8 requires that the length difference calculation indicates "how much the length of the **remaining part** of the input symbol string **not examined** in the distance calculation differs from the lengths **remaining** in the symbol strings passing through the calculation point".

The "edit distance calculation" of KWOK offered in the Official Action is not the same as the claimed length difference calculation, because these calculations are not done in the same way or to the same parts of the strings.

Rather, the claimed distance calculation is first performed (in calculation point P1 of Fig 2b, for example) to the beginning of the input symbol string "ABO" and the symbols in the trie structure "A" located before and at a calculation point ([section 0033], for example). The result of the distance calculation is: 2.

After this, a length calculation is done (section [0033]) with the 2 more characters left in the input symbol string ("RD") which have so far not been examined in the distance calculation. The length difference calculation is therefore done for these 2 characters and the 5 so far unexamined characters ("ACUS" and "OARD") of the symbol strings passing through the calculation point P1, so the length difference is: 5-2=3.

By contrast, the edit distance calculation disclosed by KWOK appears to be closer to the claimed distance calculation, and not the claimed length difference calculation.

However, the claims require both calculations to be performed not just a distance calculation.

As set forth above, any edit calculation carried out by KWOK is for a distance calculation carried out based on "distance" between two words, wherein "cat" and "cot" have an edit distance of one(1) (see paragraph [0062]).

By contrast, claim 8 recites calculating at the calculation point also the smallest possible length difference corresponding to each distance that indicates how much the length of the remaining part of the input symbol string not examined in the distance calculation differs from the lengths remaining in the symbols strings passing through the calculation point.

By way of example, paragraphs [0019]-[0022] disclose that the symbol strings are compared such as "cat" and "cot" as in KWOK, and similar to KWOK a <u>distance value</u> of one (1) is obtained. That is, when the second letter is examined, a difference of one (1) is obtained. Thereafter, an additional calculation is made based on the input symbol string <u>not examined</u> in the distance calculation. Such additional calculation is not performed by KWOK. Thus, KWOK does not meet the recited length difference calculation.

Moreover, as set forth above, due to the fundamental difference in how BALLARD and KWOK handle the data to be analyzed, one of ordinary skill in the art would not consider KWOK in combination with BALLARD.

Nevertheless, even if a person skilled in the art would have considered KWOK, the skilled person would not arrive at the claimed invention because the proposed combination of references fail to disclose a method to calculate "the remaining part of the input symbol string <u>not examined in the distance calculation</u> in order to determine a length distance calculation.

Accordingly, it would not have been obvious to combine the references in the manner suggested to meet claim 8.

Claim 15

Claim 15 recites a calculation means for calculating the smallest possible length difference that indicates how much the length of the remaining part of the input symbol string <u>not examined in a distance calculation</u> differs from the lengths remaining in the symbols strings passing through the calculation point. The analysis above regarding claim 8 is equally applicable claim 15.

Claim 16

Claim 16 recites a calculation means for calculating the smallest possible length difference that indicates how much the length of the remaining part of the input symbol string <u>not examined in the distance calculation</u> differs from the lengths remaining in the symbols strings passing through the calculation point. The analysis above regarding claim 8 is equally applicable claim 16.

The dependent claims are believed to be patentable at least for depending from an allowable independent claim.

<u>Conclusion</u>

Appellant respectfully urges that the rejections on appeal cannot be sustained and must be reversed, and such is respectfully requested.

Respectfully submitted,

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(viii)   **Claims Appendix**

8.   A computer readable medium encoded with a computer program for executing a method for searching for an input symbol string among a set of symbol strings, comprising:

creating a trie data structure of symbol strings, wherein the symbol strings are grouped into branches in such a manner that the symbol strings beginning with the same symbols belong to the same branch, and the symbol strings in the same branch divide into new branches at the symbols, from which onwards the symbols strings differ from each other,

receiving an input formed of an input symbol string,

proceeding from the starting point of the trie data structure along a branch to a calculation point indicated by the next symbol,

calculating distances at the calculation point between a sample symbol string formed by the symbols of the calculation point of the branch in question and the calculation points preceding it and the input symbol string by comparing these in alternative ways,

calculating at the calculation point also the smallest possible length difference corresponding to each distance that indicates how much the length of the remaining part of the input symbol string not examined in the distance calculation differs from the lengths remaining in the symbols strings passing through the calculation point, and calculating on the basis of each distance and corresponding length difference a reference value,

selecting repeatedly the next branch to follow to the calculation point indicated by the next symbol, at which said calculation is repeated for the new calculation point, said selection of the next branch being performed in such a manner that next the routine proceeds from the calculation point, from which the lowest reference value has been obtained as result,

after the calculation has terminated, selecting one or more symbol strings having the shortest distance to the input symbol string on the basis of the performed calculations, and using the selected symbol string(s) to produce a response.

9. A computer readable medium encoded with a computer program for executing the method as claimed in claim 8, further comprising:

comparing the distance of the symbol string or strings used to produce the response and that of the input symbol string with a predefined maximum distance, and

changing the produced response to indicate that the input symbol string was not found if the distance exceeds the maximum distance.

10. A computer readable medium encoded with a computer program for executing the method as claimed in claim 8, further comprising:

when selecting the branch, comparing said lowest reference value with the predefined maximum distance, and

terminating the calculation if the lowest reference value exceeds the maximum distance.

11. A computer readable medium encoded with a computer program for executing the method as claimed in claim 8, further comprising:

when selecting the branch, checking whether calculation is already done for the last calculation point on one of the branches, and

terminating the calculation, if it turns out that for the last calculation point of one of the branches a reference value has been obtained that is lower than the reference values obtained for all the other calculation points.

14. A method as claimed in claim 9, further comprising:

when selecting the branch, comparing said lowest reference value with the predefined maximum distance, and

terminating the calculation if the lowest reference value exceeds the maximum distance.

15. An apparatus loadable with a computer readable medium encoded with a computer program for searching for a symbol string among a set of symbol strings, the apparatus comprising:

means for creating a trie data structure of symbols strings by grouping the symbol strings into branches in such a

manner that the symbol strings starting with the same symbols belong to the same branch, and the symbols strings in the same branch divide into new branches at the symbols, from which onwards the symbol strings differ from each other,

an input for receiving an input symbol string,

calculation means for calculating distances between a sample symbol string formed by the symbols of the calculation point and the calculation points preceding it in the examined branch and the input symbol string by comparing these in alternative ways, and for calculating at the calculation points also the smallest possible length difference corresponding to each distance that indicates how much the length of the remaining part of the input symbol string not examined in the distance calculation differs from the lengths remaining in the symbols strings passing through the calculation point, and calculating on the basis of each distance and corresponding length difference a reference value,

selection means that repeatedly select the next branch to follow to the calculation point indicated by the next symbol, at which said calculation is repeated for the new calculation point, said selection means carrying out the branch selection in such a manner that next the routine proceeds from the calculation point, from which the lowest reference value has been obtained as result,

selection means that, after the calculation is terminated, select one or more symbol strings with the shortest distance to the input on the basis of the calculations,

response production means that produce a response by using the selected symbol string(s), and

an output for feeding the response onward.

16.   An apparatus including at least one circuit for searching for a symbol string among a set of symbol strings, the apparatus comprising:

means for creating a trie data structure of symbols strings by grouping the symbol strings into branches in such a manner that the symbol strings starting with the same symbols belong to the same branch, and the symbols strings in the same branch divide into new branches at the symbols, from which onwards the symbol strings differ from each other,

an input for receiving an input symbol string,

calculation means for calculating distances between a sample symbol string formed by the symbols of the calculation point and the calculation points preceding it in the examined branch and the input symbol string by comparing these in alternative ways, and for calculating at the calculation points also the smallest possible length difference corresponding to each distance that indicates how much the length of the remaining part of the input symbol string not examined in the distance calculation differs from the lengths remaining in the symbols

strings passing through the calculation point, and calculating on the basis of each distance and corresponding length difference a reference value,

selection means that repeatedly select the next branch to follow to the calculation point indicated by the next symbol, at which said calculation is repeated for the new calculation point, said selection means carrying out the branch selection in such a manner that next the routine proceeds from the calculation point, from which the lowest reference value has been obtained as result,

selection means that, after the calculation is terminated, select one or more symbol strings with the shortest distance to the input on the basis of the calculations,

response production means that produce a response by using the selected symbol string(s), and

an output for feeding the response onward.

(ix)   **Evidence Appendix**

None.

(x) **Related Proceedings Appendix**

None.